This draft to be Reviewed/revised by EPA, Guardian, TetraTech ORIGINAL These issues discussed w/ Guardian 6 Jul 00.

Roy F. Weston, Inc.
1400 Weston Way
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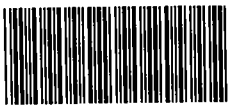
30 June 2000



Mr. Mike Towle (3HS31)
On-Scene Coordinator
U.S. Environmental Protection Agency
1650 Arch Street
Philadelphia, PA 19103-2029

Work Order No. 20101-252-003-6269

Subject: 12th Street Landfill Site
Wilmingtown, Delaware

Dear Mr. Towle:

Enclosed for your use are the following items which represent WESTON's efforts to date on the referenced project.

1. Hard copy of Drawing Nos. 2000 through 2004 (including two[2] newly developed drawings – Drawing Nos. 2003 and 2004).
2. A zip disk, in AutoCAD release 14, of the Drawings in Item 1 above.
3. Draft Specification (Section 02368) for Steel Sheet Piling including draft test boring logs and geotechnical test results. (Geotechnical Laboratory Testing was completed by URS Greiner Woodward Clyde).

We trust this information will be of use to you as you move forward on the project. It has been our pleasure working with you.

If you have further questions or require additional information, please contact me at (610) 701-7545 or Andrew Harpur at (610) 701-5293.

Very truly yours,

ROY F. WESTON, INC.

(b) (4) [redacted]

Senior Civil Engineer

cc: (b) (4) [redacted] - WESTON
(b) (4) [redacted] - WESTON

EPA = Guardian

SECTION 02368

STEEL SHEET PILING
(PRESCRIPTIVE SPECIFICATION)

PART 1 GENERAL

1.01 DESCRIPTION OF WORK

A. Furnish all labor, equipment, and materials, and perform all construction operations required to provide and install a steel sheet piling retaining wall at the locations indicated on the Drawings and as specified herein.

← Guardian to support

B. Steel sheet piling will be used as a temporary river diversion structure to permit excavation of the river bank as shown on the Drawings and as specified herein.

C. Soil boring logs prepared by WESTON and geotechnical laboratory test results are enclosed with this Specification and hereby made a part of this Specification. The approximate locations of the borings are shown on the Drawings. The sheet piling Contractor should thoroughly review the soil boring information in preparing his bid. This information is provided to the Contractor to document the subsurface conditions encountered at the site so that he may form his own judgments related to selecting the sheet piling installation equipment which is necessary to efficiently and effectively install the sheet piling to the required embedment depth. The Contractor should note that it may be necessary to remove/relocate riprap along the proposed sheet pile wall alignment in order to facilitate installation.

D. Operational constraints will be imposed on the Contractor given the limited acreage of the site. The Contractor shall stage materials and equipment only in designated areas by the EPA. Due to space limitations, the Contractor shall minimize the amount of materials and equipment staged on the site and shall schedule the delivery of materials accordingly.

E. The Contractor is hereby notified of the presence of an abandoned bulkhead in close proximity to the proposed sheet pile wall alignment. The Contractor shall take whatever precautions he deems necessary so as not to cause damage to this bulkhead during installation and removal of the sheet pile wall. If the Contractor observes any shift of the bulk head or loss of ground behind the sheet pile wall, he shall cease work immediately and notify the EPA.

F. The Contractor shall be responsible for providing whatever means, methods, and materials necessary to prevent water from flowing between the existing concrete bulkhead and the proposed temporary sheet pile wall. In order to determine

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means, methods, and materials, the Contractor should inspect the bulkhead during low tide.

G. The Contractor shall be responsible for securing all permits and notifying any agencies prior to installing sheeting and prior to commencing any pumping activities that may be required to maintain a "dry" excavation area.

H. Provide pre-installation and post-extraction surveys as well as full-time monitoring of sheet pile driving operations by an independent, qualified Subcontractor as specified in Part 1.05 below.

I. Furnish all labor, equipment, and materials, and perform all operations required to remove the steel sheet piling after site excavations and restoration has been completed.

J. The Contractor shall provide a detailed schedule for the installation and removal of the sheet piling showing the duration of each event.

1.02 QUALIFICATIONS

A. The Contractor shall have previously installed the type of sheet piling wall specified and shall have a minimum of five years of sheet piling installation experience. The Contractor shall provide evidence of satisfactory completion of at least five sheet pile wall installation contracts comparable to this in scope and subsurface conditions.

1.03 SUBMITTALS

A. The Contractor shall submit to the EPA for review and approval, written information regarding the Contractor's proposed equipment and methods for completing the installation of the steel sheet piling. This information shall include:

1. Description of the proposed equipment to be used to drive and remove the sheet piling including pile hammer and extractor, leads, crane, etc.

2. Detailed project schedule as described in Part 1, Section 1.01H.

B. The Contractor shall submit to the EPA for review and approval, relevant geometrical and structural property details of the proposed sheet pile sections to be installed at the site. The Contractor shall also provide certification that the sheet pile sections meet or exceed the steel grade and Section Modulus requirements as specified herein. This information shall also include the estimated permeability of the sheet pile interlocks (joints).

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C. The Contractor shall submit to the EPA drawings and/or descriptions detailing the means and methods to be employed to ensure minimal leakage of water between the existing concrete bulkhead upstream of the site and the proposed sheet pile wall.

D. Current Health and Safety training certificates for all on-site personnel.

1.04 SHEET PILE LOCATIONS, LINES AND GRADES

A. The Contractor shall employ, within his contract price, a Registered Land Surveyor licensed in Delaware, who is experienced in this type of work, and who shall establish sheet pile lines and grades as shown on Drawing Nos. 2003 and 2004. This surveyor shall provide an as-built drawing of the sheet piling installation work to WESTON for the project records.

This doc not seem necessary for Temp Structure

B. The approximate alignment of the sheet pile wall is shown on the drawings. If necessary and with the approval of EPA, the Contractor may adjust the alignment but in no case should the proposed sheet pile wall be any closer than 5 feet from the proposed toe-of-slope. The Contractor should note the location of the abandoned bulkhead when selecting the final sheet pile wall alignment.

YES.

C. The Contractor shall be responsible for damage to all existing structures adjacent to the proposed alignment of the sheet piling wall caused as a result of his work. Any damage and the costs of subsequent repair due to sheet piling installation or removal and/or other associated construction activities related to this work shall be the responsibility of the Contractor.

1.05 SHEET PILE INSTALLATION MONITORING AND TESTING

A. The Contractor shall employ a qualified testing agency who shall perform full-time vibration monitoring of sheet pile driving and extraction operations. The testing agency shall be experienced in monitoring this type of work as demonstrated in submitted qualifications and experience credentials as determined by EPA. Full-time monitoring of sheet pile driving operations shall include, but is not limited to:

1. Prior to sheet pile installation, the testing agency shall conduct a pre-installation survey of the existing structures around the site which are within the zone of influence of pile driving vibrations as determined by the Contractor and testing agency. The survey shall include photos, videotape, written documentation, etc. of existing cracks, damage and/or structural distress to these structures, including but not limited to the adjacent buildings and concrete bulkhead. The testing agency shall prepare a report of the results of the pre-installation survey and submit it to the EPA prior to the sheet piling installation work.

2. Placement of an appropriate number of ground vibration monitoring instruments at appropriate locations near existing adjacent structures, as determined by the Contractor and testing agency, to monitor the peak particle velocities (PPV) of ground vibrations due to the sheet pile installation and extraction work. Peak particle velocity at any monitoring location shall not exceed two (2) inches per second at any time during the pile installation or extraction work. If measured PPV's exceed this limiting value, sheet pile installation/extraction operations will cease immediately and appropriate remedial measures (e.g. use of a different hammer) will be implemented to maintain measured peak particle velocity values at levels below the limiting value.

3. Immediately following extraction of all sheet piling, the testing agency shall conduct a post-extraction survey of the site area which includes returning to those structures investigated during the pre-installation survey and photographing, videotaping and generating written documentation of the post-extraction conditions of these structures. Additionally, the survey shall also include noting any new damage to these or other structures possibly related to sheet pile driving/removal operations. The pre-installation and post-extraction surveys will provide a means to assess any possible damage claims from owners of adjacent structures. The testing agency shall prepare a report of the results of the post-extraction survey and submit it to the EPA following extraction of the sheet piling. The Contractor shall be responsible for repairs to any structures damaged by sheet piling installation/extraction activities at no cost to the EPA. The repairs shall be conducted, at a minimum, such that the structure is returned to the pre-installation condition noted during the pre-installation survey.

4. Provide daily quality control reports to the EPA including the maximum measured peak particle velocity values as a function of time and a summary of the sheet pile installation work completed during the day.

PART 2 PRODUCTS

2.01 SHEET PILE DRIVING EQUIPMENT

A. The pile driving rig shall be of adequate size and capacity to permit driving the sheet piles to the general alignment and locations shown on the Drawings and within the required axial alignment.

B. All sheet piling shall be driven with a vibratory hammer or an impact hammer operating in fixed leaders or other methods shall be used to hold the hammer and sheet piling in accurate alignment. Leaders shall be equipped with extensions to hold the hammer and sheet pile in alignment when the hammer operates below the bottom of the leaders.

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C. The sheet pile hammer and its associated value of rated energy shall be selected by the Contractor so as to minimize the potential for damage to surrounding structures from ground vibrations.

D. The drivehead shall be constructed to hold the sheet pile in concentric alignment with the hammer and with a machined shoulder to uniformly and fully engage the end of the sheet pile.

2.02 STEEL SHEET PILE

A. Sheet piles shall have a minimum delivered length of 25 feet.

B. Sheet piles shall be Z sections manufactured from ASTM A572 Grade 50 steel and shall have hot rolled "watertight" interlocks. The minimum required Section Modulus of all sheet piling sections shall be T.B.D. in^3/foot of wall.

C. Sheet piling may be fitted with a pointed steel driving shoe if determined to be appropriate to facilitate more effective pile driving.

D. New or used steel sheet piling sections may be provided for the work. However, used sections are subject to a visual inspection by the EPA. Should this inspection reveal that these sections or their interlocks are severely damaged, bent, rusted, etc., they may be either rejected immediately based on this inspection or conditionally approved subject to structural testing at the Contractor's expense.

per T.T. min. length = 10

E. Used or new sections of sheet piling of less than ___ foot length which are welded together to form ____ foot long sections will not be permitted for the work.

PART 3 SHEET PILE INSTALLATION AND EXTRACTION

3.01 SHEET PILE LOCATION/ALIGNMENT

A. Steel sheet piles shall be installed along the alignment shown on the Drawings, unless adjusted in accordance with Part 1.04 A of this specification.

B. The maximum deviation from the required axial (i.e., vertical) alignment of sheet piles shall be 2 percent of the sheet pile length. The Contractor shall be responsible for installing, at his expense, any sheet piles which require extraction and reinstallation due to misalignment, as determined by the EPA.

C. The Contractor may elect to pre-excavate a trench/notch along the sheet piling alignment to remove surficial obstructions, e.g., riprap, at locations where these surficial structures exist.

PREFER NO IF POSS. MOVE rip rap & go.

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D. All personnel shall be trained in accordance with 29 CFR 1910.120. Copies of current training certifications shall be submitted to WESTON for all on-site personnel.

3.02 EMBEDMENT DEPTH

A. All sheet pile sections shall be installed to a minimum embedment depth of 17 feet below immediately adjacent existing site grades.

B. All sheet pile sections shall have a "stickup" above existing site grades no greater than _____ feet or elevation 8, whichever is less.

3.03 SHEET PILE EXTRACTION

A. The Contractor shall extract all sheet piling sections and load these materials on trucks for removal from the site.

END OF SECTION

ATTACHMENT NO. 1

TEST BORING LOGS AND STRATIGRAPHIC PROFILE

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WESTON — **SOIL BORING LOG** — PAGE 1 OF 1

				Groundwater Level Date	Groundwater Level Depth
Job Name / Job No.	12th Street Landfill	Boring No. / Surface Elev.	GT-1 / 1.5 ft (est.)		
Date Drilled	12 June, 2000	Boring Method	Hollow Stem Auger		
Drilling Co.	Site	Completion Depth	30.0 ft bgs		
Drill Foreman	(b) (4)	Location	52' south of wall		
Logged By	(b) (4)				

Depth (feet)	Sample No.	Sample Type*	Sample Blow Counts** (per 6 in.)	N Value**		Visual Description	Stratum Elev.	% Rec	% RQD	Laboratory Tests
5	1	SS	1-1-2-2	3	2-3'	M-C sand, qtz., sub-angular, black with organic material		90		
					3-3.8'	65% silt, 35% clay, dark gray, v. soft, v. cohesive.				SILT
	2	SS & ST	W.O.H. (after ST)		6-7.1'	65% silt, 35% clay, dark gray, semi-liquid. C = 100 psf		55		
10	3	SS	1-1-2-1	3	10-11.8'	60% silt, 35% clay, 5% organic, dark gray, v. soft, v. cohesive.		90		
							-11.5			
	4	ST						0		
15							-13.5			
	5	SS	1-2-2-2	4	16-17.2'	25% F-M sand, 15% clay, 55% silt, 5% F gravel, v. soft.		75		SILTY CLAY
					17.2-17.	85% F-M sand, 15% silt, v. soft.				
20	6	SS	5-7-9-15	16	20-20.7'	25% F-M sand, 15% clay, 55% silt, 5% F gravel, v. soft.		35		SAND
	7	ST				$N_{ave} = 10$ $\phi = 29°$		0		
25							-23.5			
	8	SS	7-13-14-15	27	26-27'	running sands, lt. Gray, 90% M-C sand, sub-angular, 10% silt, trace of organics.		50		
	9	SS	17-15-14-13	29	28-29.6'	running sands, lt. Gray, 90% M-C sand, sub-angular, 10% silt, trace of organics.	-28.5	80		SAND
30						note: blow counts may be high in areas of running sands.				
				$N_{ave} = 28$		ϕ 38°				
35										

*Sample type: SS-Split Spoon; ST-Shelby Tube; RC-Rock Core

Laboratory Tests: MC-Moisture Content; AL-Atterberg Limits; SH-Sieve/Hydrometer Analysis; SG-Specific Gravity; OC - Organic Content; C-Consolidation; CU-Consolidated Undrained Triaxial; UCS-Unconfined Compressive Strength; K-Hydraulic Conductivity; BD - Bulk Density

**ASTM D-1586 Standard Penetration Test

$\phi = \sqrt{20N + 15^\circ} =$

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WESTON — **SOIL BORING LOG** — PAGE 1 OF 1

Job Name	12th Street Landfill	**Boring No.**	GT-2	**Groundwater Level**	
Job No.		**Surface Elev.**	1.5 ft (est.)	**Date**	**Depth**
Date Drilled	8-9 June, 2000	Boring Method	Hollow Stem Auger		
Drilling Co.	Site Engineers.	Completion Depth	30.0 ft bgs		
Drill Foreman	(b) (4)	Location	357' south of wall		
Logged By	(b) (4)				

Depth (feet)	Sample No.	Sample Type*	Sample Blow Counts* (per 6 in.)	N Value*		Visual Description	Stratum Elev.	% Rec	% RQD	Laboratory Tests
	1	SS	2-2-2-2	4	2-3.5'	5YR3/1, 60% silt, 40% clay, micaceous, v. soft. $N_{fie}=3.3$ $C=100psf$		75		SILT
5	2	SS	2-2-2-2	4	6-6.6'	5YR3/1, 60% silt, 40% clay, micaceous, v. soft.		30		
	4	ST								SILT + CLAY.
10	5	SS	1-1-1-2	2	10-11.5'	5YR3/1, 60% silt, 40% clay, v. soft.	-9.5	75		
	3	SS	5-10-11-19	~~21~~	11-12.5'	5YR4/1, 40% sand, 20% grav., 20% silt, 20% clay, soft to v. soft.		75		
15	6	SS	2-2-2-3	4	14-14.5'	5YR3/1, 60% M sand, 20% silt, 20% clay, v. soft. $N_{fie}=6$ $\phi=26^\circ$		25		SILTY CLAYEY SAND
	7	SS	4-4-4-4	8	18-18.8'	65% silt, 30% clay, 5% F sand, mottled yellow brown.		40		
20							-19.5			
	8	SS	15-17-19-20	36				0		
25										SAND
	9	SS	32-35-27-25	62	26-26.8'	M sand, lt. Gray, qtz., sub-angular.		40		
	10	SS	33-35-49-42	84	28-28.6'	M sand, lt. Gray, qtz., sub-angular.		30		
30							-28.5			
35						$N_{fie}=73$ $\phi=53^\circ$.				

Sample type: SS-Split Spoon; ST-Shelby Tube; RC-Rock Core

Laboratory Tests: MC-Moisture Content; AL-Atterberg Limits; SH-Sieve/Hydrometer Analysis; SG-Specific Gravity; OC - Organic Content; C-Consolidation; CU-Consolidated Undrained Triaxial; UCS-Unconfined Compressive Strength; K-Hydraulic Conductivity; BD - Bulk Density

*ASTM D-1586 Standard Penetration Test

base log

Print Date: 6/22/00 3:17 PM

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WESTON — **SOIL BORING LOG** — PAGE 1 OF 1

Job Name	12th Street Landfill	**Boring No.**	GT-3	**Groundwater Level**	
Job No.		**Surface Elev.**	1.5 ft (est.)	**Date**	**Depth**
Date Drilled	7 June, 2000	Boring Method	Hollow Stem Auger		
Drilling Co.	Site	Completion Depth	30.0 ft bgs		
Drill Foreman	(b) (4)	Location	516' south of wall		
Logged By	(b) (4)				

Depth (feet)	Sample No.	Sample Type*	Sample Blow Counts** (per 6 in.)	N Value**		Visual Description	Stratum Elev.	% Rec	% RQD	Laboratory Tests
	1	SS	0-1-0-1	1		no recovery C=100 psf N_{AVE}=1.3		0		
5										SIEVE
	2	SS	0-0-1-0	1	6-6.5'	5YR3/1, silt and clay, micaceous, trace of organics, v. soft, 1/2" of sand and gravel.		75		
10	3	SS	1-1-1-1	2	10-11.6	5YR3/1, silt and clay, micaceous, trace of organics, v. soft, 1/2" of sand and gravel.	-11.5	80		
15		SS	4-4-5-7	9	14-14.6'	5YR3/1 25% gravel, 60% F-M sand, 15% silt, soft, rounded, micaceous. N_{AVE}=9.5 ϕ=28.8°		30		SAND
20		SS	5-5-7-9	12	18-18.6'	5YR6/2, 75% M-F gravel, 25% C sand, rounded, loose.	-18.5	30		GRAVEL
		SS	10-11-12-14	23	20-20.3'	5YR6/2, 75% M-F gravel, 25% C sand, rounded, loose.		15		
25		SS	10-12-15-17	27	24-24.9'	5YR5/4, sand and gravel, F-M gravel, M-C sand, rounded.		45		SAND
30		SS	9-12-14-16	26	28-28.6'	5YR5/4, sand and gravel, F-M gravel, M-C sand, rounded.	28.5	30		
35						N_{AVE}=25 ϕ=37°				

*Sample type: SS-Split Spoon; ST-Shelby Tube; RC-Rock Core

**ASTM D-1586 Standard Penetration Test

Laboratory Tests: MC-Moisture Content; AL-Atterberg Limits; SH-Sieve/Hydrometer Analysis; SG-Specific Gravity; OC - Organic Content; C-Consolidation; CU-Consolidated Undrained Triaxial; UCS-Unconfined Compressive Strength; K-Hydraulic Conductivity; BD - Bulk Density

base log

Print Date: 6/22/00 3:17 PM

ATTACHMENT NO. 2

GEOTECHNICAL TEST RESULT

ORIGINAL

URS Greiner Woodward Clyde
A Division of URS Corporation

1400 Union Meeting Road, Suite 202
Blue Bell, PA 19422-1972
Tel. 215.542.3800
Fax: 215.542.3888
Offices Worldwide

June 27, 2000
42-0PHL3185.00

Ms. (b) (4)
Roy F. Weston, Inc.
5 Underwood Court
Delran, NJ 08075-1229

Re: Geotechnical Laboratory Testing Report
12th Street Landfill
Wilmington, Delaware

Dear Ms. Murphy:

We are pleased to present herewith our report on laboratory testing for the above project. The testing service was performed in accordance with your Purchase Order No. 0014158, dated June 6, 2000. The following tests were conducted:

- Moisture Content of Soils, ASTM D 2216
- Particle Size Analysis of Soils, ASTM D 421/422
- Atterberg Limits, ASTM D 4318
- Organic Content, ASTM D 2974
- USCS Classification, ASTM D 2487
- Specific Gravity, ASTM D 854
- UU Triaxial Compression, ASTM D 2850

It has been our pleasure to assist you on this project. If you have any questions concerning the information on this project, or if we may be of further service to you, please do not hesitate to contact us.

Very truly yours,

(b) (4)
Project Engineer

(b) (4)
Principal Engineer

cc: (b) (4) P.E., Roy F. Weston

Project No.: 420PHL3185.00 Task 00001
12th Street Landfill, Wilmington

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LABORATORY TESTING DATA SUMMARY

BORING NO.	SAMPLE NO.	DEPTH (ft)	DESCRIPTION	IDENTIFICATION TESTS								
				WATER CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLAS. IND.	USCS SYMB.	SIEVE MINUS NO. 200 (%)	HYDROMETER % MINUS 2 μm (%)	ORGANIC CONTENT (%)	SPECIFIC GRAVITY
GT-1		10-12	Dark brown CLAY, trace organics	71.4	61	29	32	CH	97.9	33		
GT-1		16-18	Brown clayey medium to fine SAND	24.5				SC(1)	44.2	17		
GT-1		26-28	Brown medium to fine SAND, trace silt	19.8				SW-SM	9.2			
GT-2	ST-1	8-10	Dark brown CLAY, trace organics	74.1	87	33	54	CH	98.0	28	4.0	
GT-2		18-20	Mottled light brown-light gray CLAY, trace fine sand	37.6	42	19	23	CL	92.9	33		2.74
GT-2		26-28	Brown medium to fine SAND, trace coarse sand, silt	16.5				SW-SM	10.8			2.69
GT-3		10-12	Dark brown CLAY, trace organics	70.4	61	29	32	CH	97.5	11		2.65
GT-3		18-20	Dark brown clayey gravelly coarse to fine SAND	25.4	33	21	12	SC	25.4	8		

Notes: (1) The USCS symboll is based on visual observation.

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Prepared by: NG Reviewed by: Date: 06/27/2000

Project No.: 420PHL3185.00 T00001 File: Indx1.xls

12th Street Landfill
LABORATORY TESTING DATA SUMMARY

BORING NO.	SAMPLE NO.	DEPTH (ft)	IDENTIFICATION TESTS					STRENGTH		REMARKS
			WATER CONTENT (%)	ORGANIC CONTENT (burnoff) (%)	TOTAL UNIT WEIGHT (pcf)	DRY UNIT WEIGHT (pcf)	Type Test	PEAK DEVIATOR STRESS (psi)	AXIAL STRAIN @ PEAK STRESS (%)	
GT-2	ST-1				93.1					
	ST-1(1)		67.6							
	ST-1(B)		72.5		97.6	56.6	UU@2psi	3.29	15.00	
	ST-1(2)		72.9							
	ST-1(C)		72.3		97.3	56.5	UU@4psi	5.89	6.26	
	ST-1(3)		74.1							
	ST-1(D)		79.2		96.1	53.6	UU@6psi	4.48	10.76	

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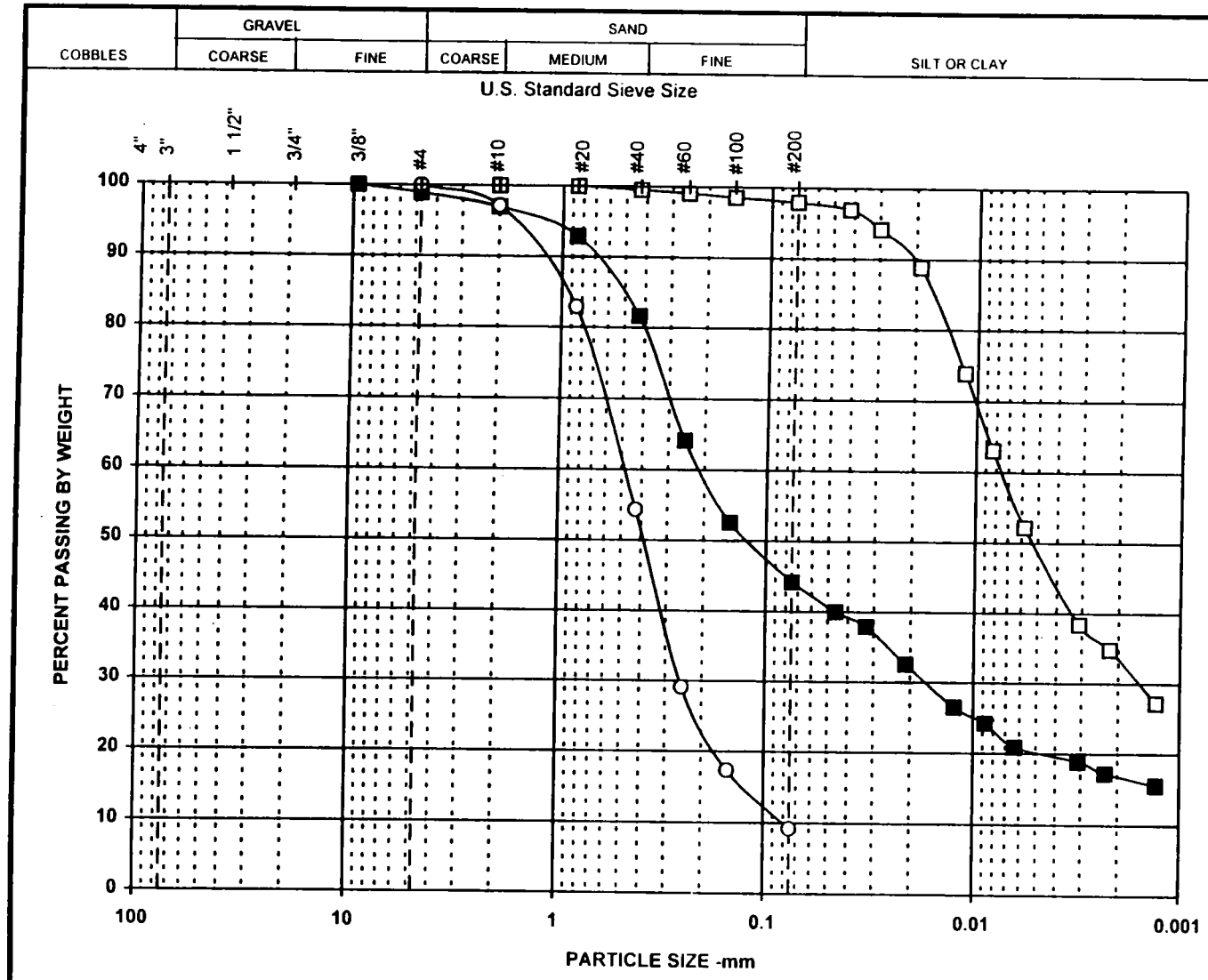
Reviewed by: Date: 06/27/2000



SYMBOL	DESCRIPTION AND REMARKS
□	Dark brown CLAY, trace organics
■	Brown clayey medium to fine SAND
○	Brown medium to fine SAND, trace silt

Symbol	□	■	○
Boring	GT-1	GT-1	GT-1
Sample			
Specimen			
Depth	10'-12'	16'-18'	26'-28'
% +3"			
% Gravel		1.1	
% SAND	2.1	54 7	90 8
% FINES	97.9	44.2	9 2
% -2μ	33	17	
Cc			1.6
Cu			6 2
LL	61		
PL	29		
PI	32		
USCS	CH	SC	SW-SM
w (%)	71.4	24.5	19 8

Particle Size	PERCENT FINER		
(Sieve #)	□	■	○
4"			
3"			
1 1/2"			
3/4"			
3/8"		100.0	
4		98 9	100 0
10	100.0	97.0	97 1
20	99.9	92.9	82 9
40	99.5	81 6	54 3
60	99.0	64.1	29 1
100	98.5	52.6	17 3
200	97.9	44.2	9 2

PARTICLE SIZE DISTRIBUTION

12th Street Landfill, Wilmington

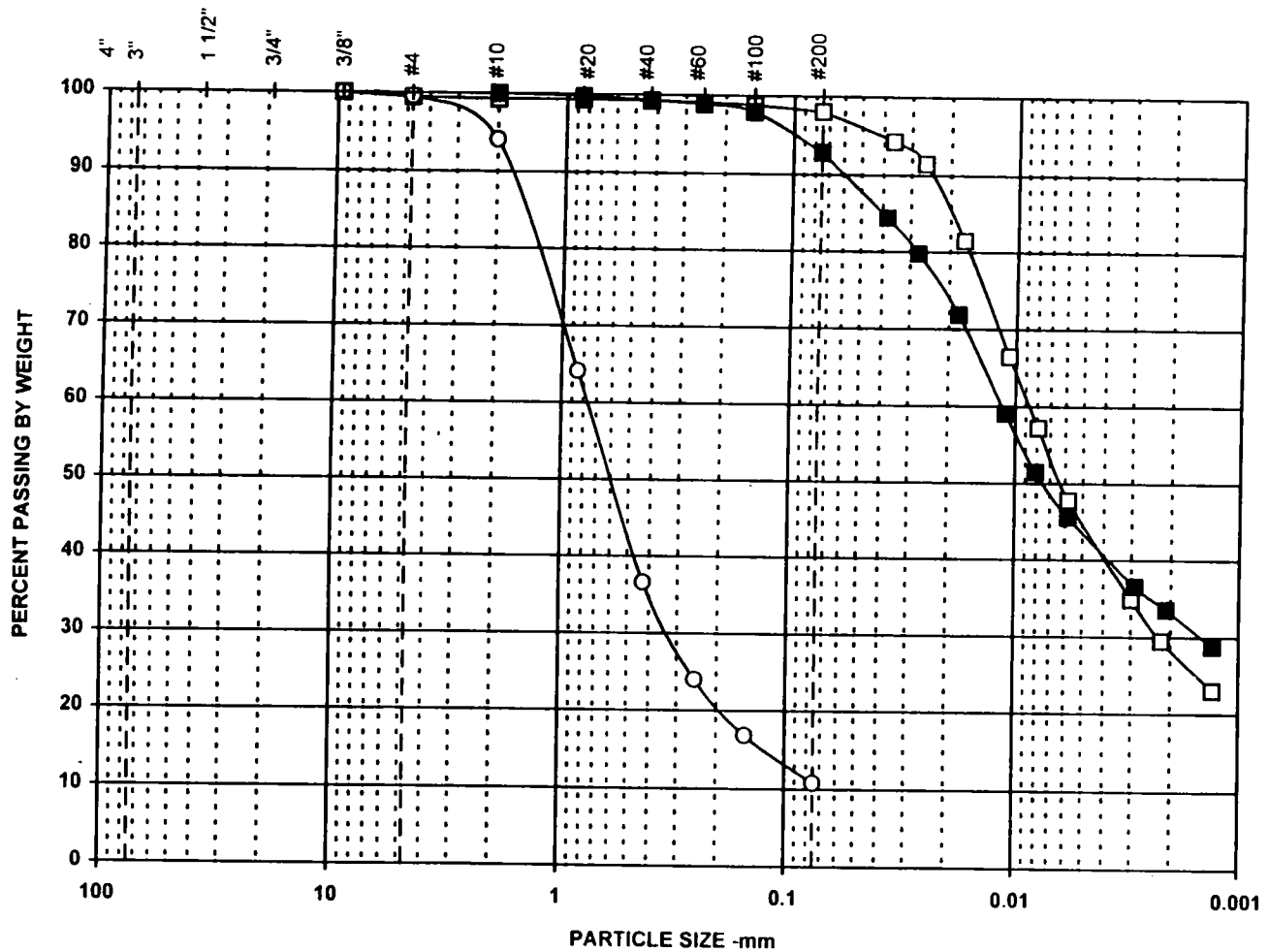
Project No.		
42-0PHL3185.00	06/23/2000	Figure 1

URS GREINER WOODWARD CLYDE

Sieve1.xls 06/27/2000

COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

U.S. Standard Sieve Size



SYMBOL	DESCRIPTION AND REMARKS
□	Dark brown CLAY, trace organics
■	Mottled light brown-light gray silty CLAY, trace fine sand
○	Brown medium to fine SAND, trace coarse sand, silt

Symbol	□	■	○
Boring	GT-2	GT-2	GT-2
Sample	ST-1		
Specimen			
Depth	8'-10'	18'-20'	26'-28'
% +3"			
% Gravel	0.5		0 5
% SAND	1.5	7.1	88.7
% FINES	98.0	92.9	10 8
% -2μ	28	33	
Cc			2 2
Cu			12.0
LL	87	42	
PL	33	19	
PI	54	23	
USCS	CH	CL	SW-SM
w (%)	74.1	37.6	16.5

Particle Size	PERCENT FINER		
(Sieve #)	□	■	○
4"			
3"			
1 1/2"			
3/4"			
3/8"	100.0		100 0
4	99.5		99 5
10	99.3	100.0	94.0
20	99.3	99.7	64 1
40	99.2	99.3	36 6
60	99.1	98.8	24 0
100	98.8	97.9	16 8
200	98.0	92.9	10 8

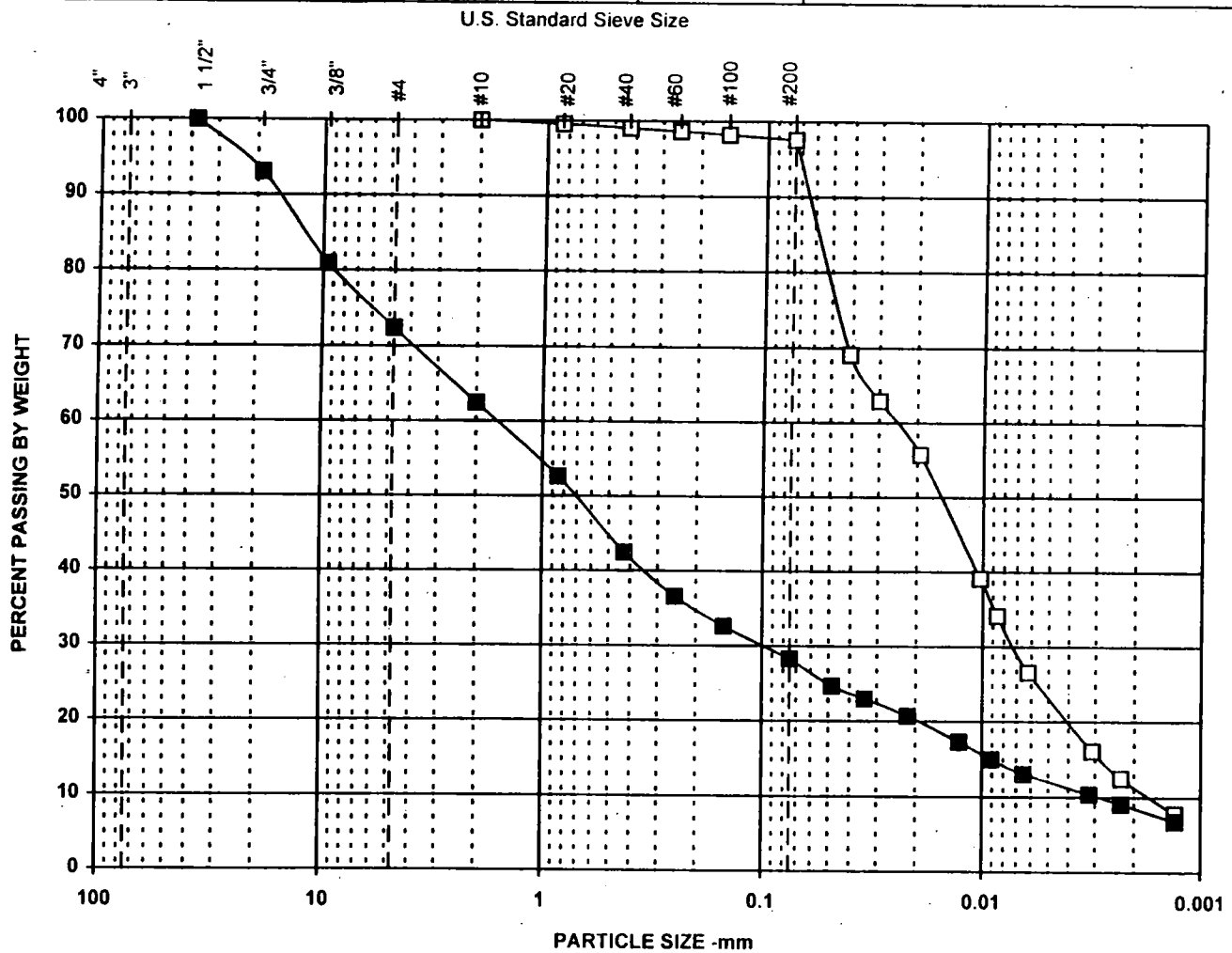
PARTICLE SIZE DISTRIBUTION

12th Street Landfill, Wilmington

Project No.		
42-0PHL3185.00	06/23/2000	Figure 2

URS GREINER WOODWARD CLYDE

ORIGINAL



SYMBOL	DESCRIPTION AND REMARKS
□	Dark brown CLAY, trace organics
■	Dark brown clayey gravelly coarse to fine SAND
○	

Symbol	□	■	○
Boring	GT-3	GT-3	
Sample			
Specimen			
Depth	10'-12'	18'-20'	
% +3"			
% Gravel		27.6	
% SAND	2.5	44.1	
% FINES	97.5	28.3	
% -2μ	11	8	
Cc			
Cu			
LL	61	33	
PL	29	21	
PI	32	12	
USCS	CH	SC	
w (%)	70.4	25.4	

Particle Size	PERCENT FINER	
(Sieve #)	□	■
4"		
3"		
1 1/2"		100.0
3/4"		93.1
3/8"		80.9
4		72.4
10	100.0	62.5
20	99.6	52.7
40	99.0	42.5
60	98.6	36.6
100	98.2	32.6
200	97.5	28.3

PARTICLE SIZE DISTRIBUTION

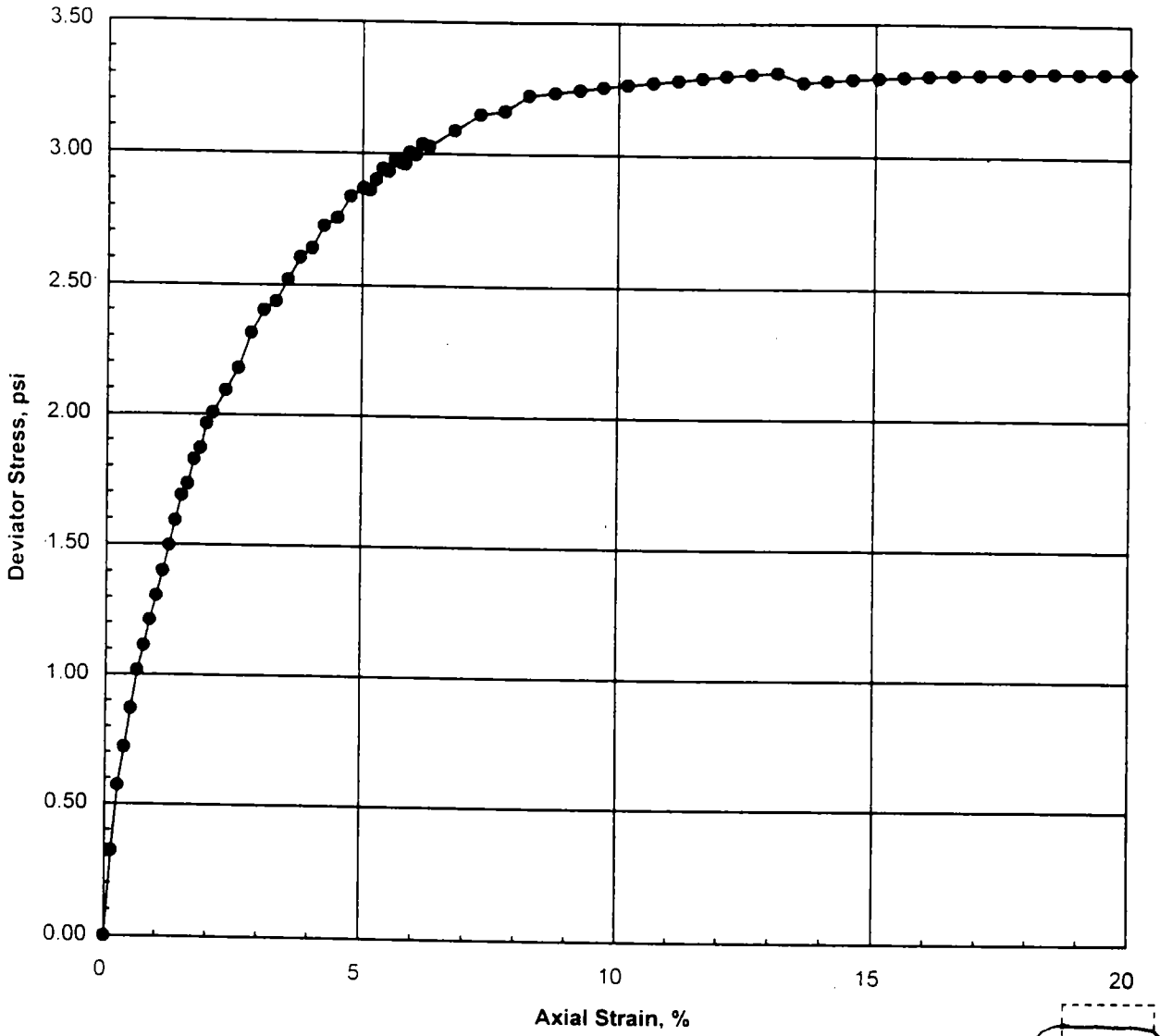
12th Street Landfill, Wilmington

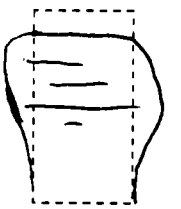
Project No.		
42-0PHL3185.00	06/23/2000	Figure 3

URS GREINER WOODWARD CLYDE

Siev3.xls 06/27/2000

ORIGINAL





FAILURE SKETCH

Specimen Information

Water Content (%)	LL	PI	Length (in)	Diameter (in)	Wet Unit Weight (pcf)	Dry Unit Weight (pcf)
72.5	87	54	6.009	2.844	97.6	56.6

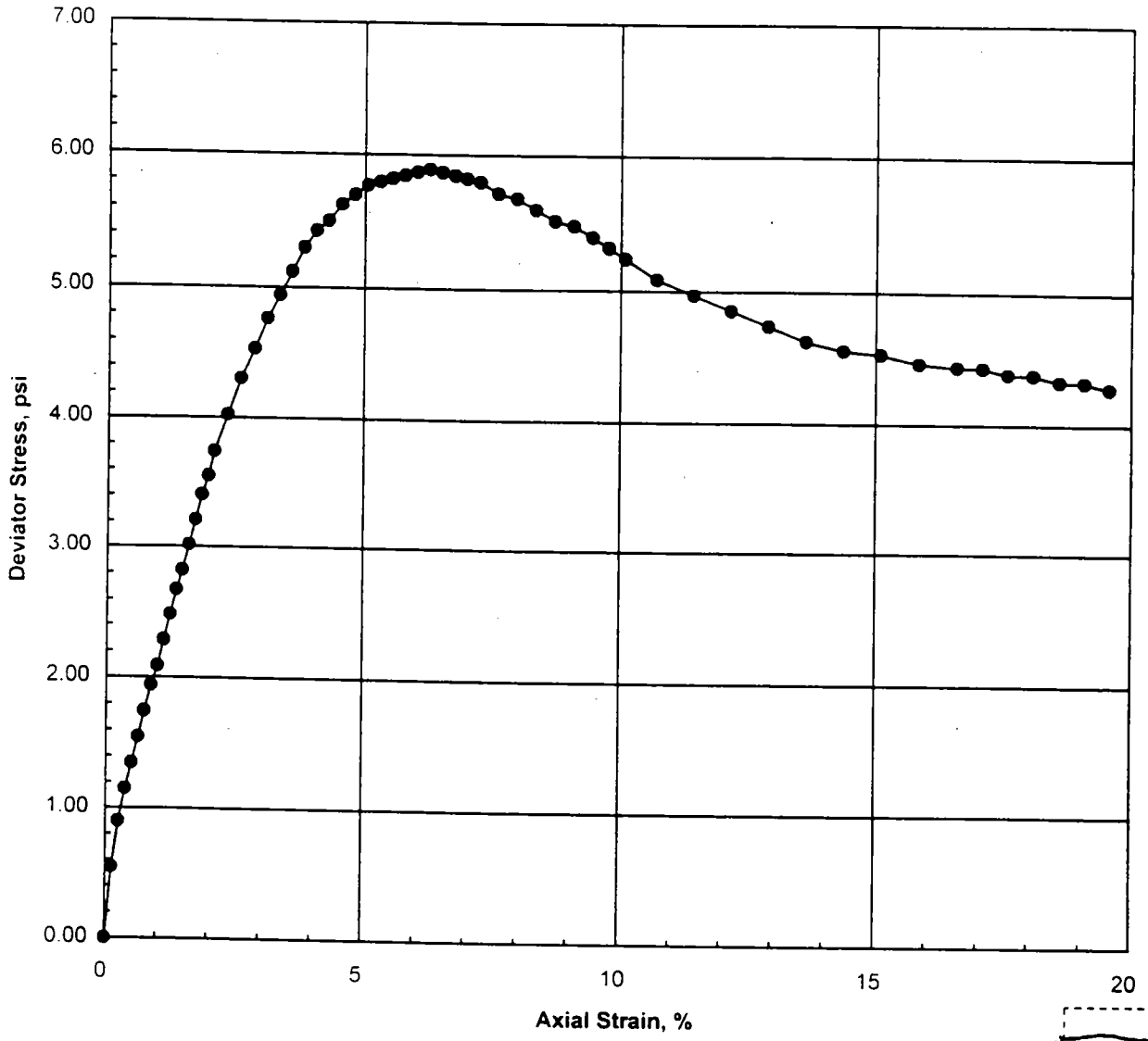
Dark brown CLAY, trace organics, fine sand-silt layers present

Test Summary

Cell Pressure (psi)	Axial Strain during confinement (%)	Compressive Strength (psi)	Strain to Peak (%)	Strain Rate (%/min)
2.00	0.00	3.29	15.07	0.73

Project No. 420PHL3185.00 T00001	**12th Street Landfill**	**UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST**	Figure 4
URS		Boring No.: ST-1 Sample No.: ST-1(B) Depth (ft): 8-10	June 2000

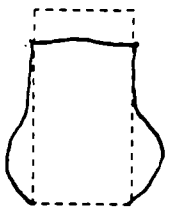
ORIGINAL



Specimen Information

Water Content (%)	LL	PI	Length (in)	Diameter (in)	Wet Unit Weight (pcf)	Dry Unit Weight (pcf)
72.3	87	54	6.016	2.842	97.3	56.5

Dark brown CALY, trace organics



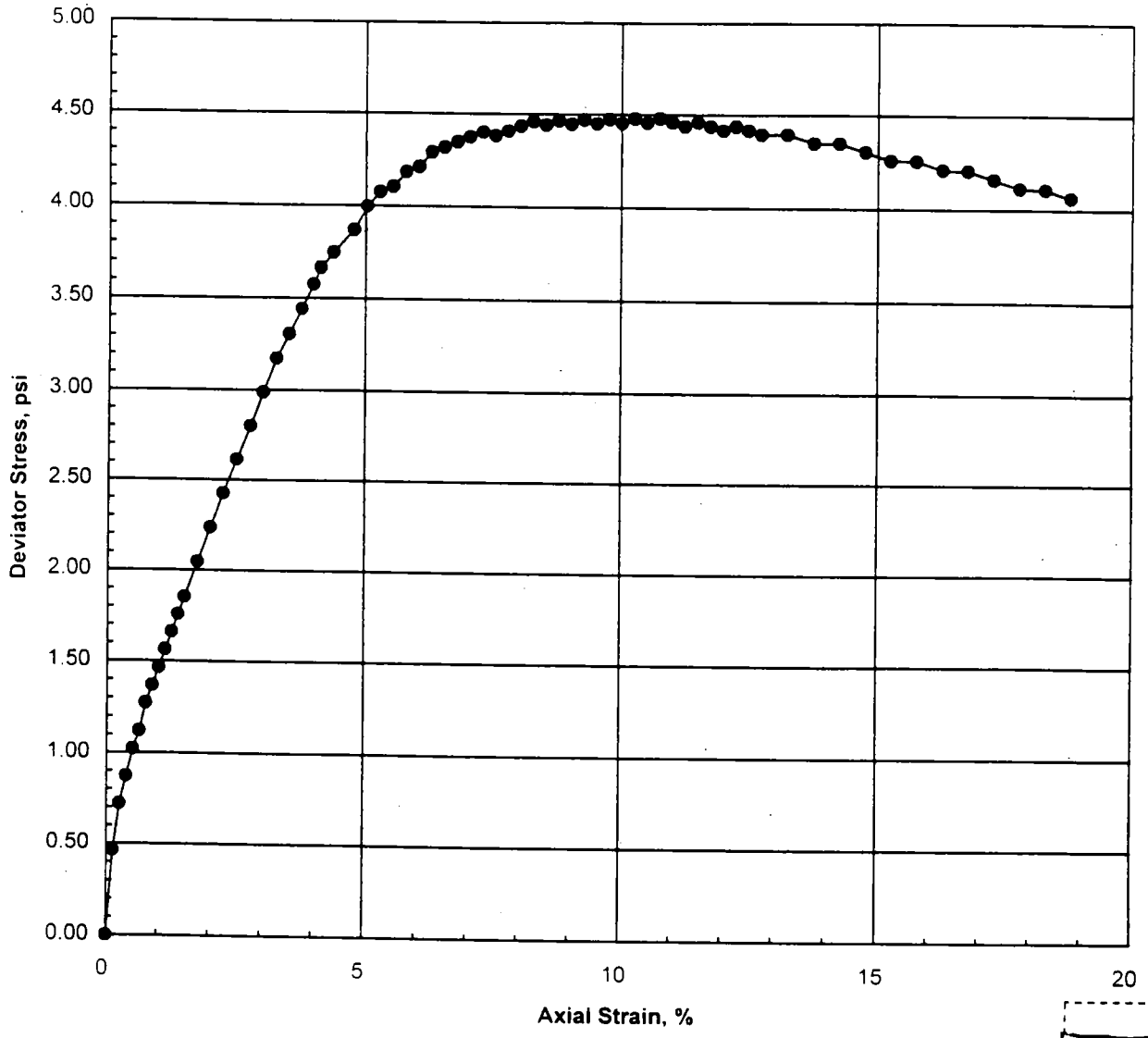
FAILURE SKETCH

Test Summary

Cell Pressure (psi)	Axial Strain during confinement (%)	Compressive Strength (psi)	Strain to Peak (%)	Strain Rate (%/min)
4.00	0.00	5.89	6.26	0.74

Project No. 420PHL3185.00 T00001	**12th Street Landfill**	**UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST**	Figure 5
URS		Boring No.: ST-1 Sample No.: ST-1(C) Depth (ft): 8-10	June 2000

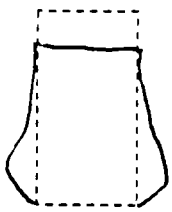
ORIGINAL



Specimen Information

Water Content (%)	LL	PI	Length (in)	Diameter (in)	Wet Unit Weight (pcf)	Dry Unit Weight (pcf)
79.2	87	54	5.902	2.819	96.1	53.6

Dark brown CLAY, trace organics

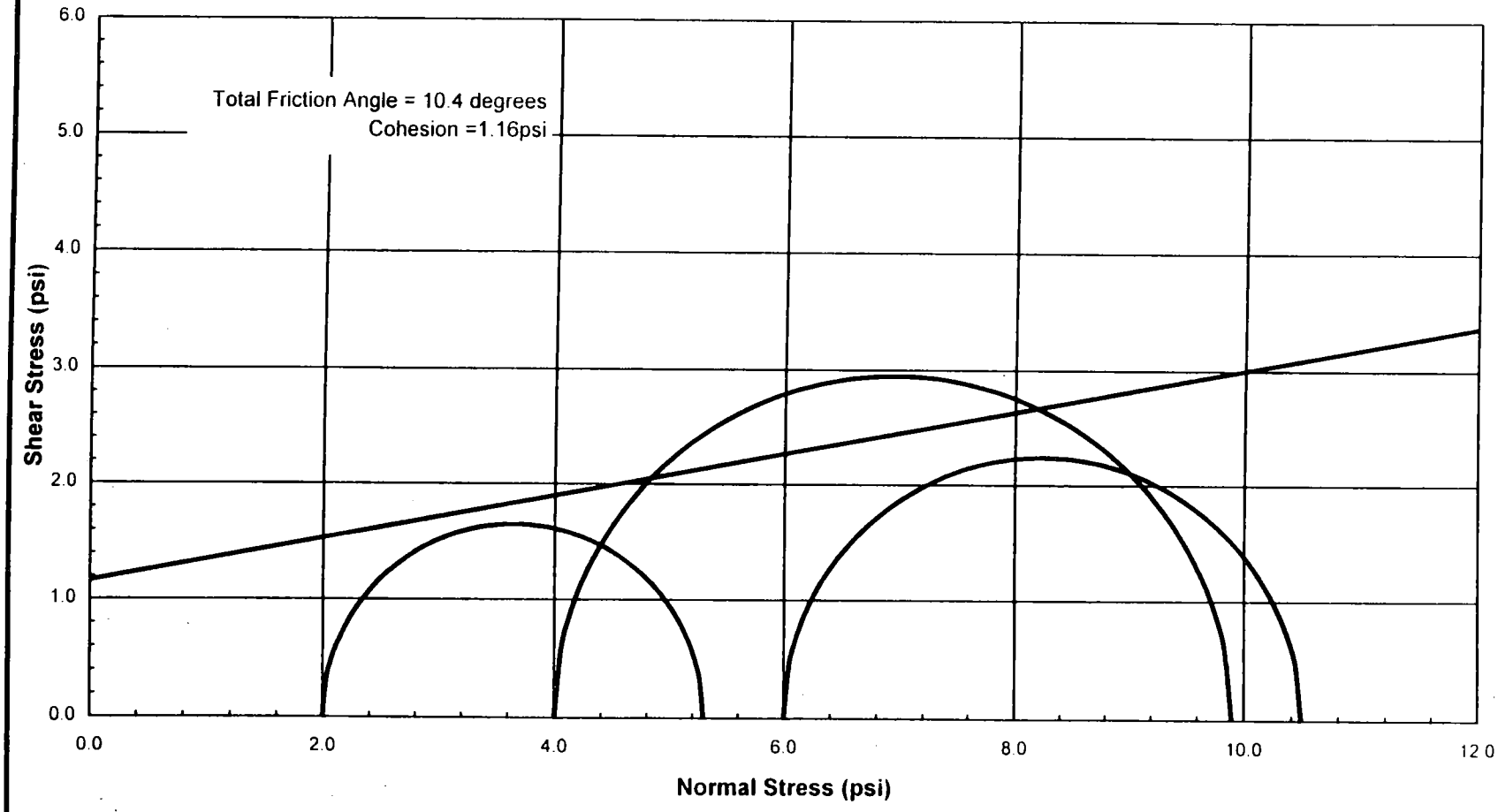


FAILURE SKETCH

Test Summary

Cell Pressure (psi)	Axial Strain during confinement (%)	Compressive Strength (psi)	Strain to Peak (%)	Strain Rate (%/min)
6.00	0.00	4.48	10.76	0.75

Project No. 420PHL3185.00 T00001	**12th Street Landfill**	**UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST**	Figure 6
URS		Boring No.: ST-1 Sample No.: ST-1(D) Depth (ft): 8-10	June 2000



Project No. 420PHL3185.00 T00001	12th Street Landfill	Mohr Circles of Total Stresses at Peak	Figure 7
URS		UU Triaxial Test Series Summary : GT-2, ST-1	June 2000

ORIGINAL

GSI Analysis File UUSUMV1.XLS

06/27/2000 Test Uusum1 xls